



# Intel® Itanium® Processor Family Reference Guide: IA-32 Execution Layer

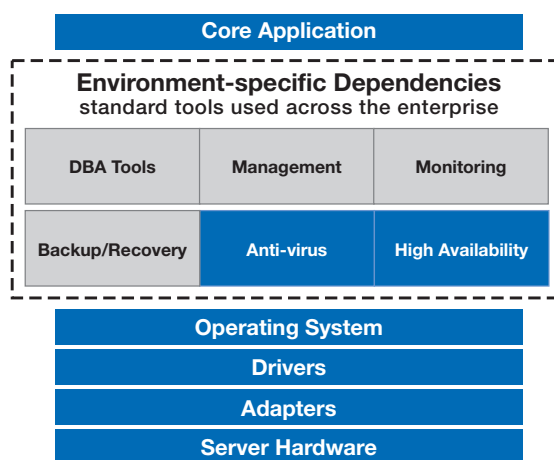
## IA-32 Application Support Provides Flexibility in Migrating to Itanium® Architecture

The Intel® Itanium® processor family has been architected to provide industry-leading performance and capabilities on high-end applications. To take advantage of the benefits of the Itanium® 2 processor, a large and growing number of software applications have been ported to native Itanium architecture code. While optimal performance is realized using native applications, support for IA-32 applications is also provided to enable IT managers flexibility in migrating to Itanium® 2-based Solutions:

- Itanium 2-based Solutions can be deployed when primary, performance-sensitive applications have been ported to Intel Itanium architecture.
  - IA-32 versions of secondary applications with less stringent performance requirements can be run on Itanium 2-based platforms.
- This provides flexibility to IT managers when converting from RISC solutions because they can tap into the broad IA-32 ecosystem.
- Figure A depicts a typical application stack for an Itanium 2-based system deployment where both native Itanium and IA-32 applications are used.
- For optimal performance, the primary, performance-sensitive application (or core application), the database, the operating system, and the drivers have all been ported to run in native Itanium architecture mode.
  - In many cases, IA-32 versions of secondary applications (database administration tools, system management, system monitoring, and backup/recovery) will deliver acceptable performance.
  - For world-class 32-bit enterprise performance, use Intel® Xeon™ processors.

### The Itanium® 2-based Solution Stack and IA-32 Application Support

Figure A below represents a typical Itanium 2-based enterprise solution stack



#### Legend:

- IA-32 or Itanium®-based Solutions
- Itanium-based Solutions optimal

## Considerations for Running 32-bit Applications on 64-bit Platforms

There are other considerations for running 32-bit applications on Intel Itanium®-based systems. Generally, 64-bit operating systems do not support 16-bit applications or 32-bit applications that include 32-bit device drivers. This applies to Itanium as well as other 64-bit platforms. For Itanium 2-based systems, 16-bit applications and 32-bit device drivers must be ported to native Itanium architecture code.

## How the IA-32 Execution Layer Works

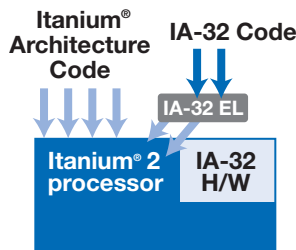
Itanium 2 processors have always provided the capability to support IA-32 applications using on-die hardware. To enhance this support and add flexibility, Intel developed a new technology called the IA-32 Execution Layer (IA-32 EL).

IA-32 EL is a software binary that will be part of leading operating systems that support Itanium architecture, including Windows\* and Linux\*.

Execution of the 32-bit applications by either the hardware or the software is transparent to the end-user. When using operating systems with IA-32 EL, support for IA-32 instructions will be provided with IA-32 EL instead of the on-die hardware (IA-32 H/W) (see Figure B below).

### IA-32 Instruction Support

Figure B depicts how IA-32 code is supported using IA-32 EL



## The Benefits of the IA-32 Execution Layer

IA-32 EL enhances Itanium 2 processor support for IA-32 applications:

- Greater flexibility in supporting new IA-32 instructions.
- Higher performance with IA-32 applications running on Itanium 2-based platforms. With an Itanium 2 processor 1.50 GHz with 6M L3 cache, IA-32 EL enables performance comparable to an Intel Xeon processor MP 1.50 GHz (varies by application).<sup>1</sup>
- As the performance increases in future generations of the Itanium processor family, performance with IA-32 EL will rise proportionately. Expectations are that IA-32 EL performance will be 50%-70% compared to performance with native Itanium-based applications.

## IA-32 Execution Layer Availability and Deployment

Production plans for IA-32 EL are as follows:

- Microsoft currently supports IA-32 EL for Windows Server\* 2003 Enterprise Edition for 64-bit Itanium-based systems, Windows Server 2003 Datacenter Edition for 64-bit Itanium-based systems, and Windows XP 64-bit Edition.
- IA-32 EL will be available with Linux operating systems from Red Hat, SUSE, and SGI in 2004.<sup>2</sup>

IA-32 EL will not require any additional enabling from application vendors or end-users. With support in production operating systems, IA-32 EL will become the default solution for running IA-32 applications on Itanium 2-based systems. Operation will be transparent to end-users. IT managers deploying solutions with operating systems carrying the IA-32 Execution Layer will realize the benefits immediately.

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For more information, visit <http://intel.com/go/itanium2>

## Footnotes

1. Based on Intel internal measurements.

2. Use of IA-32 EL with third party software may require you to obtain license rights from such third parties.

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